

# Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/IL05/000359

International filing date: 31 March 2005 (31.03.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US  
Number: 60/558,128  
Filing date: 01 April 2004 (01.04.2004)

Date of receipt at the International Bureau: 31 May 2005 (31.05.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)



World Intellectual Property Organization (WIPO) - Geneva, Switzerland  
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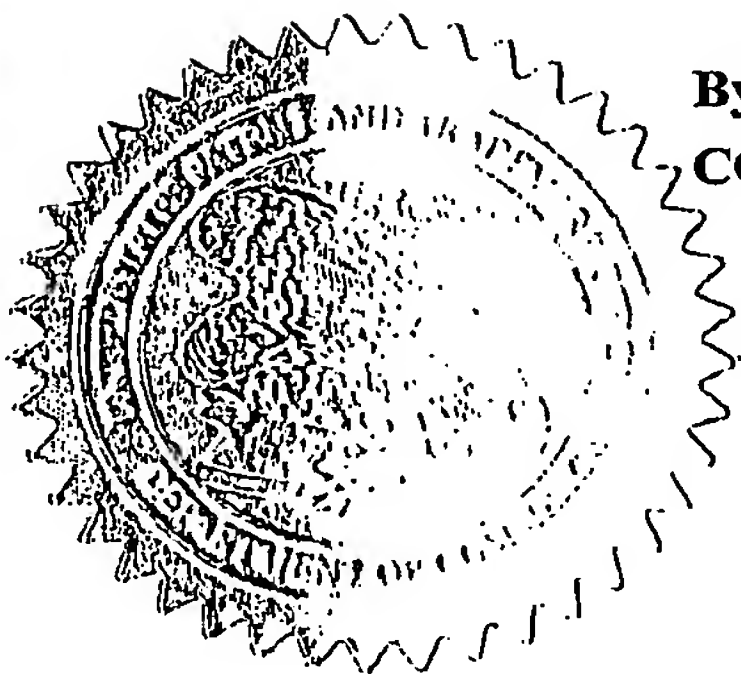
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**APPLICATION NUMBER: 60/558,128**

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04/14/2004 BSAYASI1 00000038 60558128

01 FC:2005

80.00 OP

PTO-1556  
(5/87)



16698 U.S. PTO

PTO/SD/18 (10-01)

Approved for use through 10/31/2002/ OMB 085-0032  
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# PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

22154 U.S. PTO  
60/558128



INVENTOR (S)					
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<input type="checkbox"/> Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (500 characters max)					
Unattended Data Storage System					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input type="checkbox"/> Customer number		<input type="text"/>		<div>Place Customer Number Bar Code Label here</div>	
		Type customer number here			
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/>	Specification	Number of Pages	8	<input type="checkbox"/> CD(S), Number	<input type="text"/>
<input checked="" type="checkbox"/>	Drawing(s)	Number of sheets	6	<input type="checkbox"/> Other (specify)	<input type="text"/>
<input type="checkbox"/>	Application Data Sheet. See 37 CFR 1.76				
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
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<input type="checkbox"/>	A check or money order is enclosed to cover the filing fees				\$80
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input type="checkbox"/>	No.				
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Respectfully submitted,

SIGNATURE

*Victor Waiman*

Date

March 23, 2004

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C/0036/0000

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C1361017

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# **Unattended Data Storage System**

## **BACKGROUND OF THE INVENTION**

The present invention relates to the field of automatic systems for recording data over optical media and more specifically to mechanical systems for recording data over multiple optical media units.

The use of optical media, such as compact disc (CD) and digital versatile disc (DVD), is ever expanding. Optical media drives have become an integral part of any standard personal and professional computer. The high reliability and the ease of use have made reading and writing data onto the CD and DVD a common method for transferring and storing data. But the CDs and DVDs have a limited storage capacity and the ever growing needs for disc space demands that on many occasions users wanting to transfer data or to make backups need to use multiple discs. In such cases the user needs to manually replace the discs according to the needs of the reading or writing application, a restriction that turns potentially automatic tasks into tasks that are depended on manual operation. There is therefore a need for an apparatus that can automatically change the discs in the CD or DVD drive of the computer and would relieve the need for a manual execution of such operations.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

These and further features and advantages of the invention will become more clearly understood in light of the ensuing description of a preferred embodiment thereof, given by way of example only, with reference to the accompanying drawings, wherein-



Figure 1 is an illustration of a general overview of the preferred embodiment of the present invention;

Figure 2 illustrates different components of the preferred embodiment of the present invention;

Figures 3a, 3b, 3c, 3d are different sections of the preferred embodiment of the present invention;

Figure 6 is a flowchart of the operation of the preferred embodiment of the present invention.

Figures 5 and 6 are illustrations of the electronic circuit that control the system;

## **DESCRIPTION OF THE PREFERRED EMBODIMENTS**

In light of the shortcoming of the present day technology as described above, the present invention is a new, simple and low cost solution for performing automatic and unattended data storage and retrieval tasks. The present invention is an apparatus which automates the data storage procedure of recording files on multiple compact discs (CD) or on digital versatile discs (DVD) without relaying on the intervention of a human operator. The preferred embodiment of the present invention is a simple mechanic apparatus which operates the transference of empty discs into the disc drive, and remove it from the disc drive once the disc writing and reading procedures are completed. As illustrated in figure 1, the apparatus 10, whose mode of operation is described below, is positioned on top of a CD or DVD drive 11. The different components that compose apparatus 10 are illustrated in greater detail in figure 2. The two disc stocking units 12a, 12b positioned on either side of the apparatus may hold stocks of discs 17. On top of the disc drive 11 there is a tower 14. The arm 16 is connected to the tower 14 on one end and at the other end it has a disc handling device 15 comprised of vacuum suction cups, a printer and a print visual recognizer. This device enables the apparatus 10 to get a grip on a disc using the vacuum suction cups, print data on it and read printed data from it. The disc drive 11 and the discs are standard home and office equipments and are not within the scope of the invention. Additionally,

it is to be understood that the automatic and unattended data storage and retrieval system of the present invention can be utilized for any type of optical disc drive such as an audio CD, a CD-ROM, or a video CD or DVD.

Following is a description of the apparatus's method of operation which may be better understood with reference to drawings 3a-3d of the apparatus and to flowchart 4. Before operating the apparatus 10 a stock of empty discs 17 is placed by the operator at the disc stock holder 12 on one side of the apparatus (in this example the empty discs are place on the right side of the apparatus in disc stock holder 12b). As the apparatus receives a command to operate, the tower 14, which rotates on its axis R182 and makes a full circle 30, turns counter-clockwise in the direction of disc stock holder 12b. As the arm 16 reaches the center of the disc stock holder 12b and is positioned above the holder's rod 32b it stops. The arm, which may move up and down, is lowered until it reaches the top disc of stock 17. Activating the vacuum suction cups allows the arm 16 to get a grip on the top disc and pick it up from the stock. Once the vacuum suction cups have a grip on the disc the arm 16 is pulled back up. The tower 14 then turns clockwise until the arm 16 is aligned with disc drive tray 13. The arm 16 is lowered until the disc is situated in its proper place inside the disc drive tray 13, as illustrated in figure 3c and 3d. The vacuum suction cups are then deactivated and the arm 16 is pulled back up leaving the disc in the disc drive tray 13. The disc drive 11 may then be commanded to close its tray 13 and is ready to operate.

Once the operation on the disc is completed the disc drive 11 is commanded to open its tray 13 and the apparatus 10 may then remove the disc. This operation continues the circular movement of the tower 14 and arm 16 in the clockwise direction: the arm 16 is lowered to pick up the disc from the disc drive tray 13 using the vacuum suction cups. It is then pulled up, the tower rotates until the arm is aligned with the left disc stock holder 12a and is lowered until the disc is put in place. As is evident in figure 3a, device 15 includes a circular opening that matches the radius of

the disc stock holder rod 32 and allows it to reach discs on the bottom of the disc stock holders 12 without colliding with its rod 32. The printer on the disc handling device 15 may be then used to print relevant data on the disc. Then the vacuum suction cups are turned off and the arm is pulled back up. In order to continue the process the tower 14 turns again to the left disc stock holder 12a to pick up the next disc.

Figures 5 and 6 are schematic illustrations of the electronic circuit that control the system. A reset circuitry based on Schottky inverters U3A, U3B and passive components are used to ensure proper power up activation of the system. The USB microcontroller U2 connects the system to a host computer through a universal serial bus (USB) and provides the logic signals to activate the robot under software control. A USB hub U5 is used to select USB signal sources as provided by a host computer, by the microcontroller U2, the printer or by the disc drive. Voltage logic level converters and drives U4, U6 allow connection of 5V electronic circuits to 3.3V electronic circuits. The 3.3 voltage is locally generated on the electronics board by a 5V to 3.3V voltage converter U7. The two motors which are used in the system to rotate the robot tower and move the robot arm up and down are driven by motor drivers U9, U10. The air compressor which generates the vacuum in the vacuum suction cups is generated by a power driver U8. Proximity switches are installed in the robot assembly to detect the height of the robot arm in relation to the tower and the direction it is facing. They are driven by sensor circuits connected to the microcontroller U2 and pull-up electronics R30 - R43.

The invention may also include a cataloging algorithm which can print on each disc the relevant information according to the recorded data on the disc using readable ASCII characters which may be read using a compatible disc drive or any available text viewer program. Such information may include size, generation date and the path of the original location of the stored data, as well as the sequential number of the current disc in the estimated total number of discs



used in the procedure, specific preprogrammed information and any other information that may be needed for the identifying the specific disc.

Similarly the device may be programmed to search for a specific disc from the stock 17, according to the data printed on it. In this case the apparatus flips through the disc stock by transferring the discs one by one from one disc stock holder to the other, reading the label of each disc as it reaches it, until the desired disc is found.

The horizontal rotation movement of the tower is enabled by screw R182 (shown in figure 3a) whose rotation movement is controlled by a motor. The vertical movement of the arm is performed on three tower rods 34 (as shown in figure 3d). This movement is controlled by a second motor.

Following is an example of the catalog format of the recorded data used by the software of this invention:

SESSION NUMBER: XXX

CURRENT DISC NUMBER: ###

SESSION STARTING DATE: DD-MM-YYYY  
SESSION ENDING DATE: DD-MM-YYYY

STARTING DATE OF DISC NUMBER 001: DD-MM-YYYY  
ENDING DATE OF DISC NUMBER 001: DD-MM-YYYY

STARTING DATE OF DISC NUMBER 002: DD-MM-YYYY  
ENDING DATE OF DISC NUMBER 002: DD-MM-YYYY

STARTING DATE OF DISC NUMBER [### - 1]: DD-MM-YYYY  
ENDING DATE OF DISC NUMBER [### - 1]: DD-MM-YYYY

LIST OF FILES, PATH, GENERATION DATE, SIZE IN DISC NUMBER [001]  
LIST OF FILES, PATH, GENERATION DATE, SIZE IN DISC NUMBER [002]

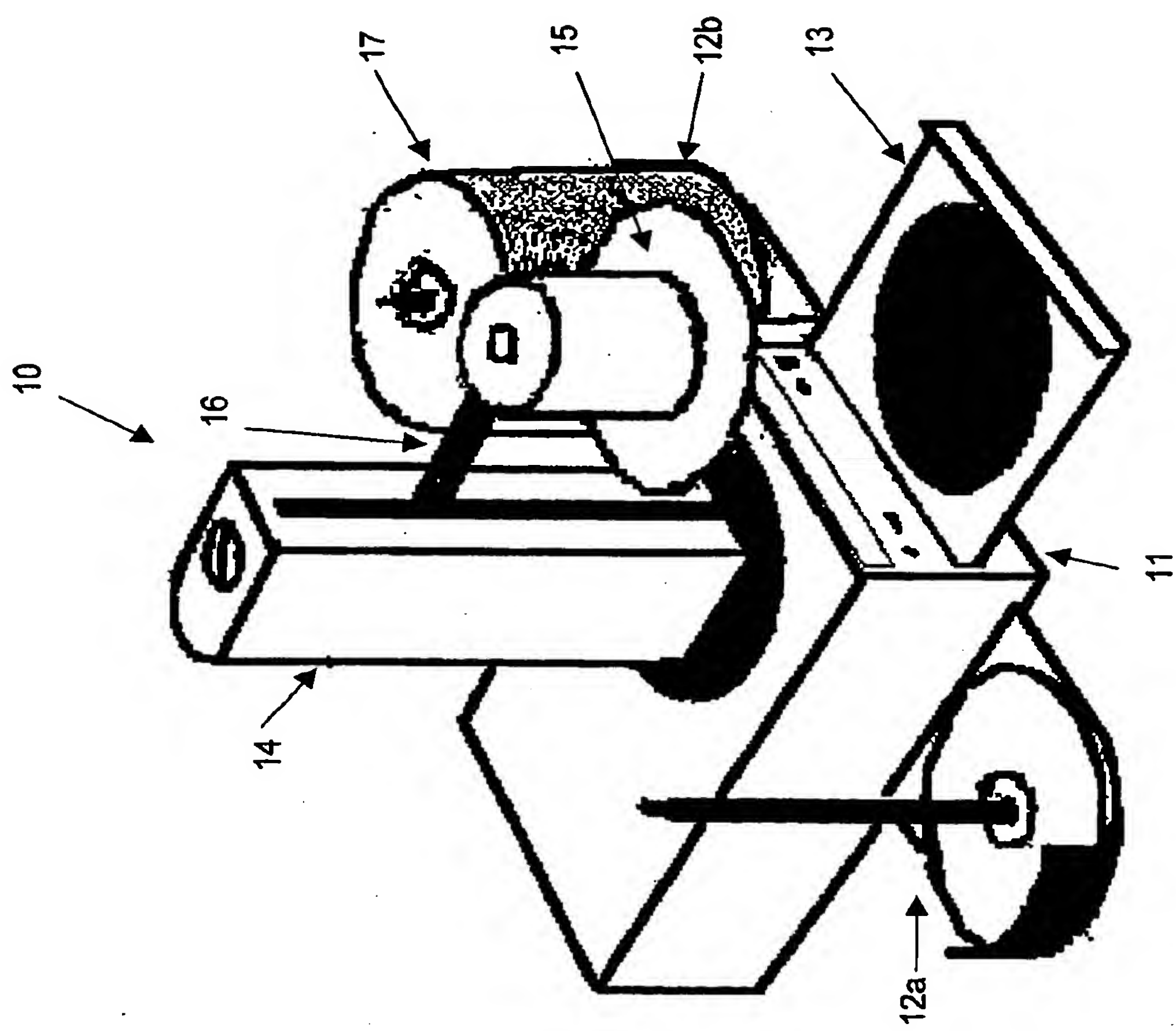
While the above description contains many specificities, these should not be construed as limitations on the scope of the invention, but rather as exemplifications of the preferred embodiments. Those skilled in the art will envision other possible variations that are within its

scope. Accordingly, the scope of the invention should be determined not by the embodiment illustrated, but by the appended claims and their legal equivalents.

What is claimed is:

1. An automatic data storage system comprising a programmable automatic handler with a picking up and placing arm, enabling to change a media storage component within a writing-reading device during a data storage process, wherein the media storage component is replaced each time the reading-writing operation is completed.
2. The data storage system of claim 1 further comprising means enabling thermal printing on each media storage component throughout the storage process.
3. The data storage system of claim 1 further comprising means to format and generate a catalog of the stored information that includes the list of files stored in any individual storage media component, date of the file generation, size of the stored file, list of all printed information on the discs, contents of all the discs previously recorded and estimated location of the storage sessions to follow until the complete session finishes.
4. Method as said in claim 1 is a method to record the catalog of the stored information after each session in every recorded disc and after recording every disc.
5. The thermal transfer printer as said in claim 1 means to print on each individual recorded disc by an integrated thermal transfer printer. The printer prints date, serial number and customer defined information to identify the recorded disc as an independent element in the data storage process without the need of reading the disc contents to identify the date and other customer defined information

6. Scheduler as appears in claim 1 means a scheduler for unattended operation based on the selection of what to record and when to carry out the recording



# Figure 1



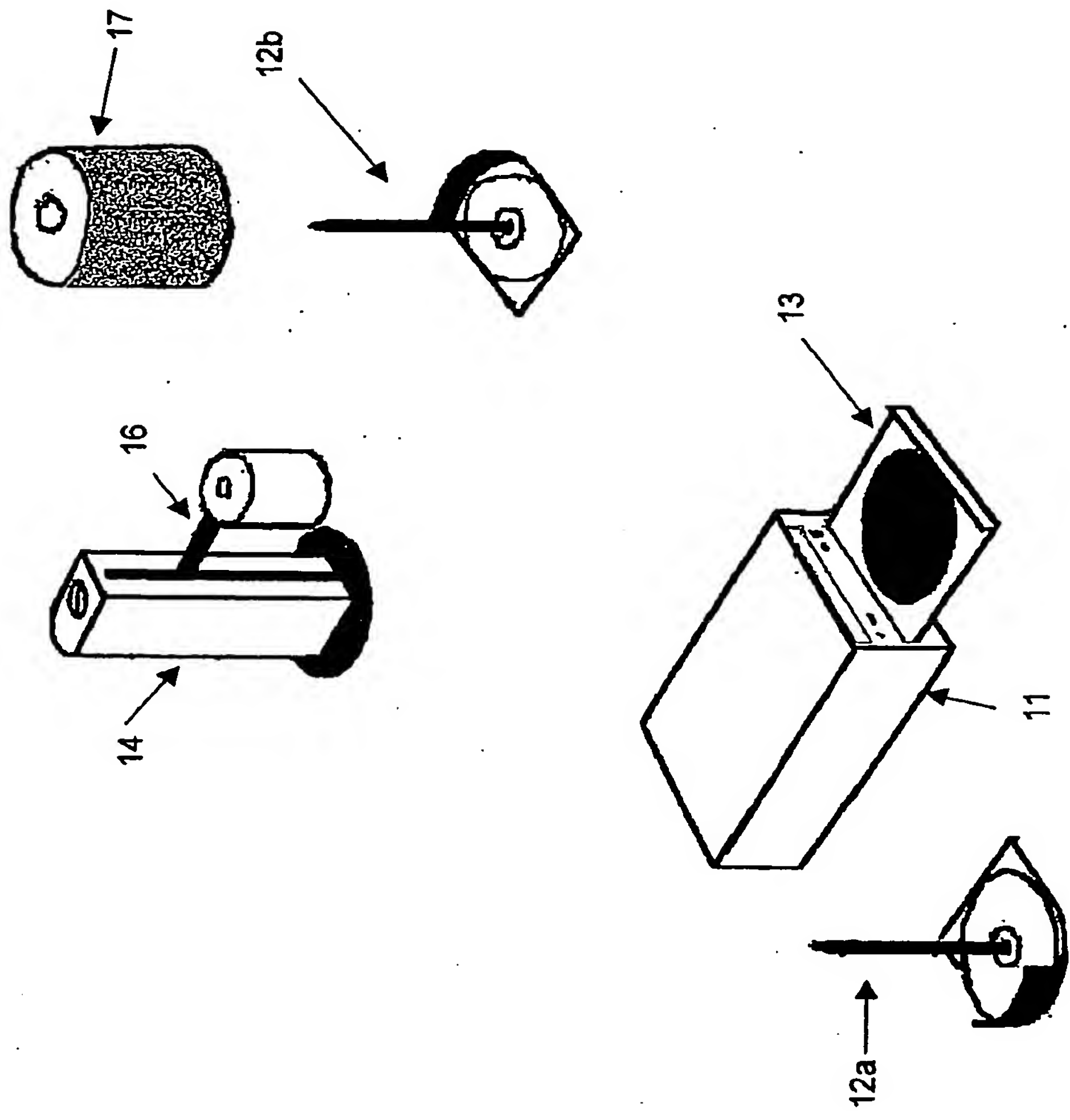


Figure 2

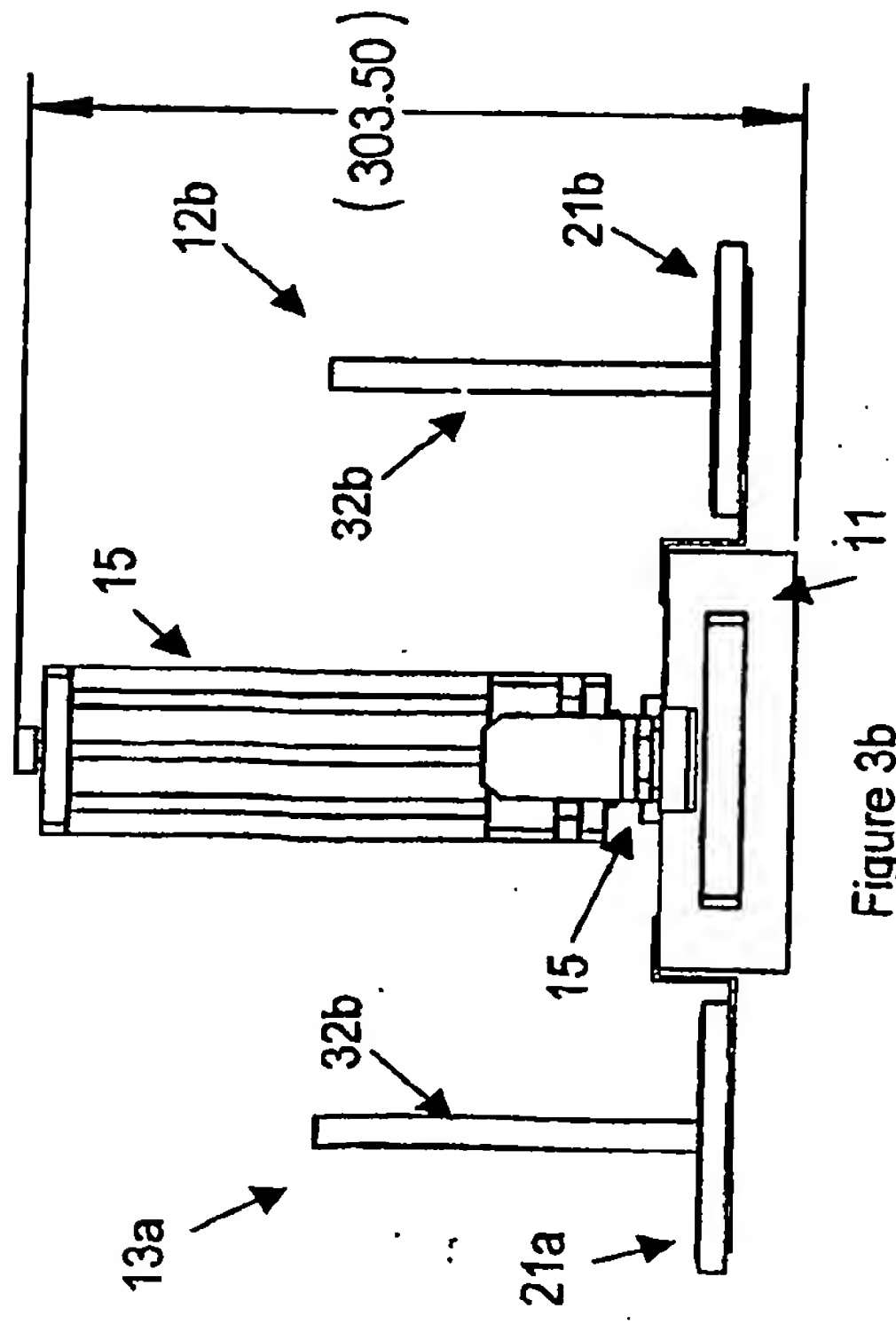


Figure 3b

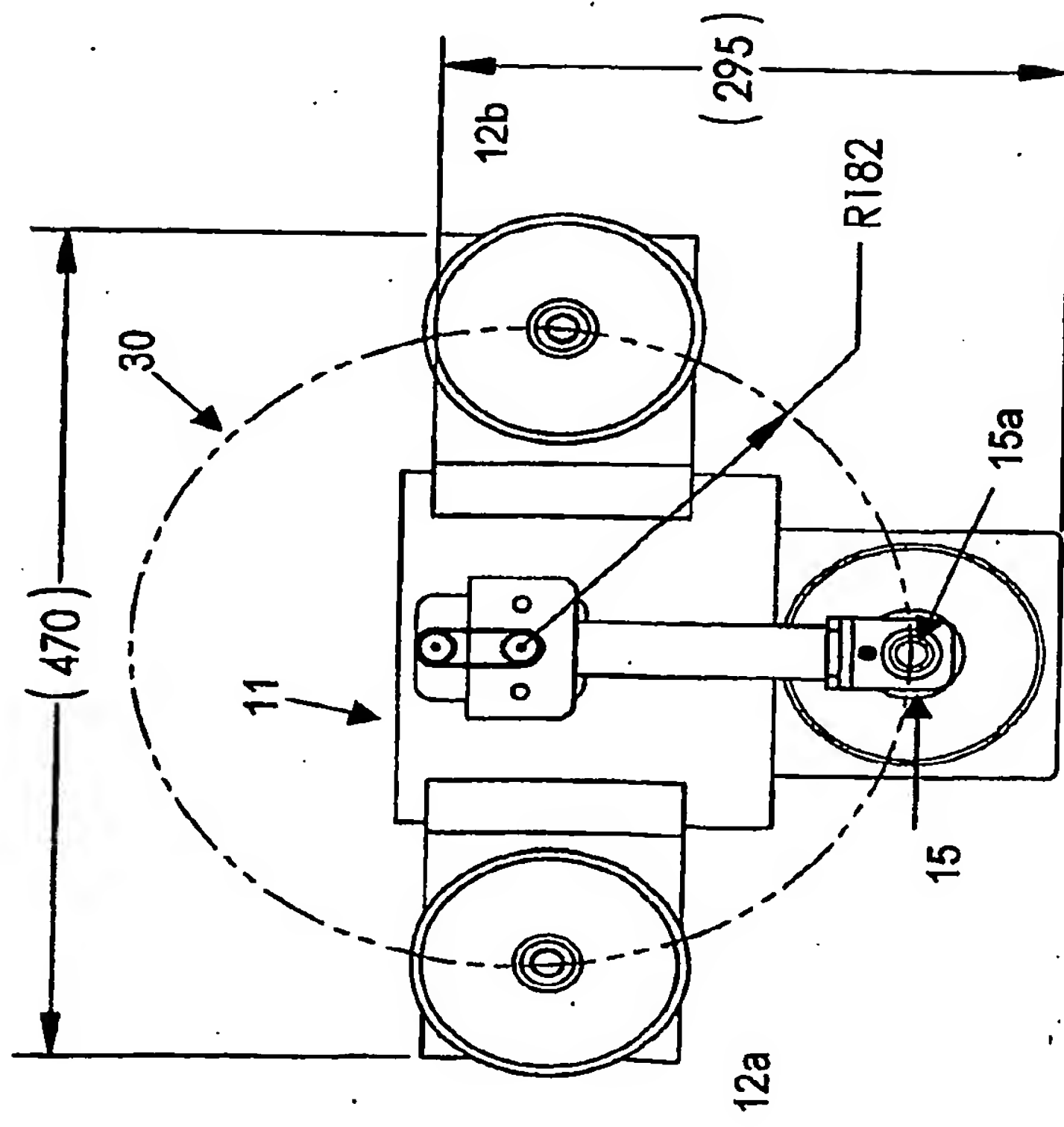


Figure 3a

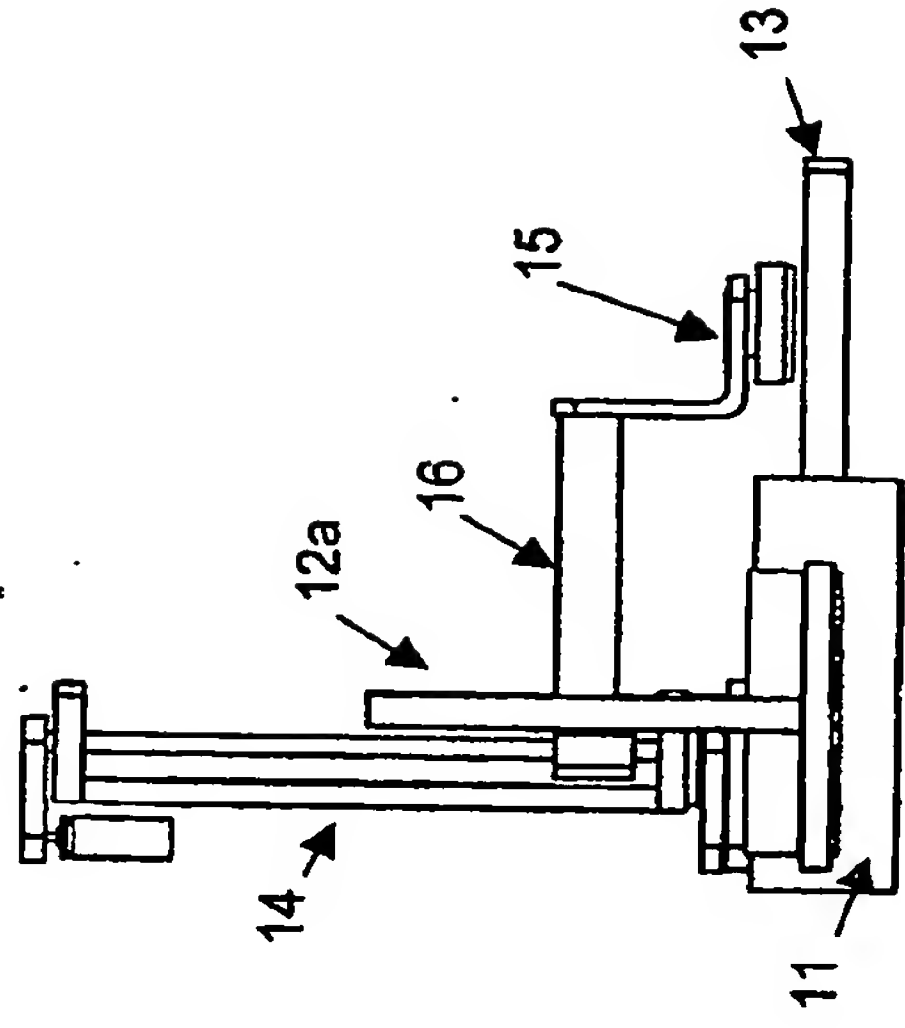


Figure 3c

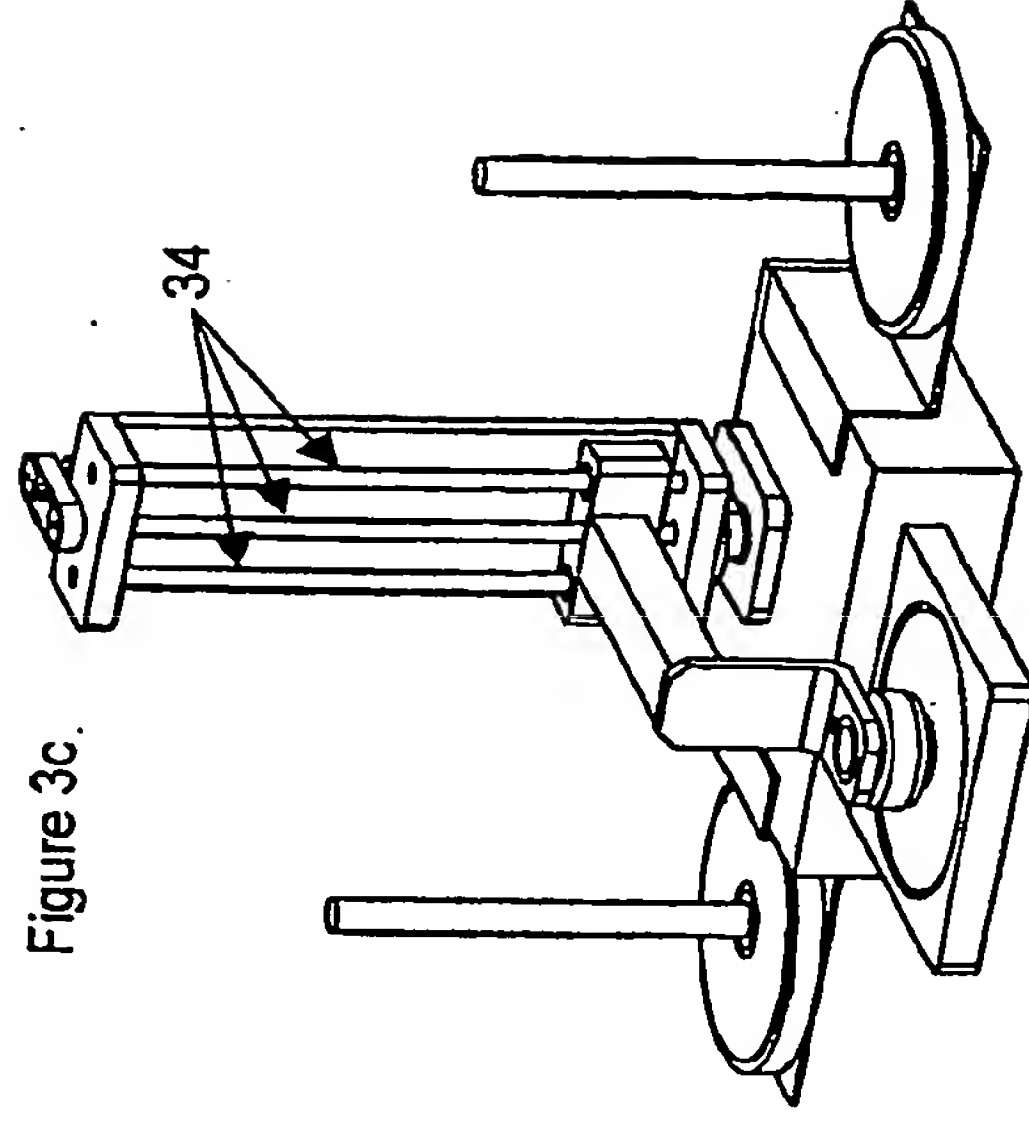


Figure 3d

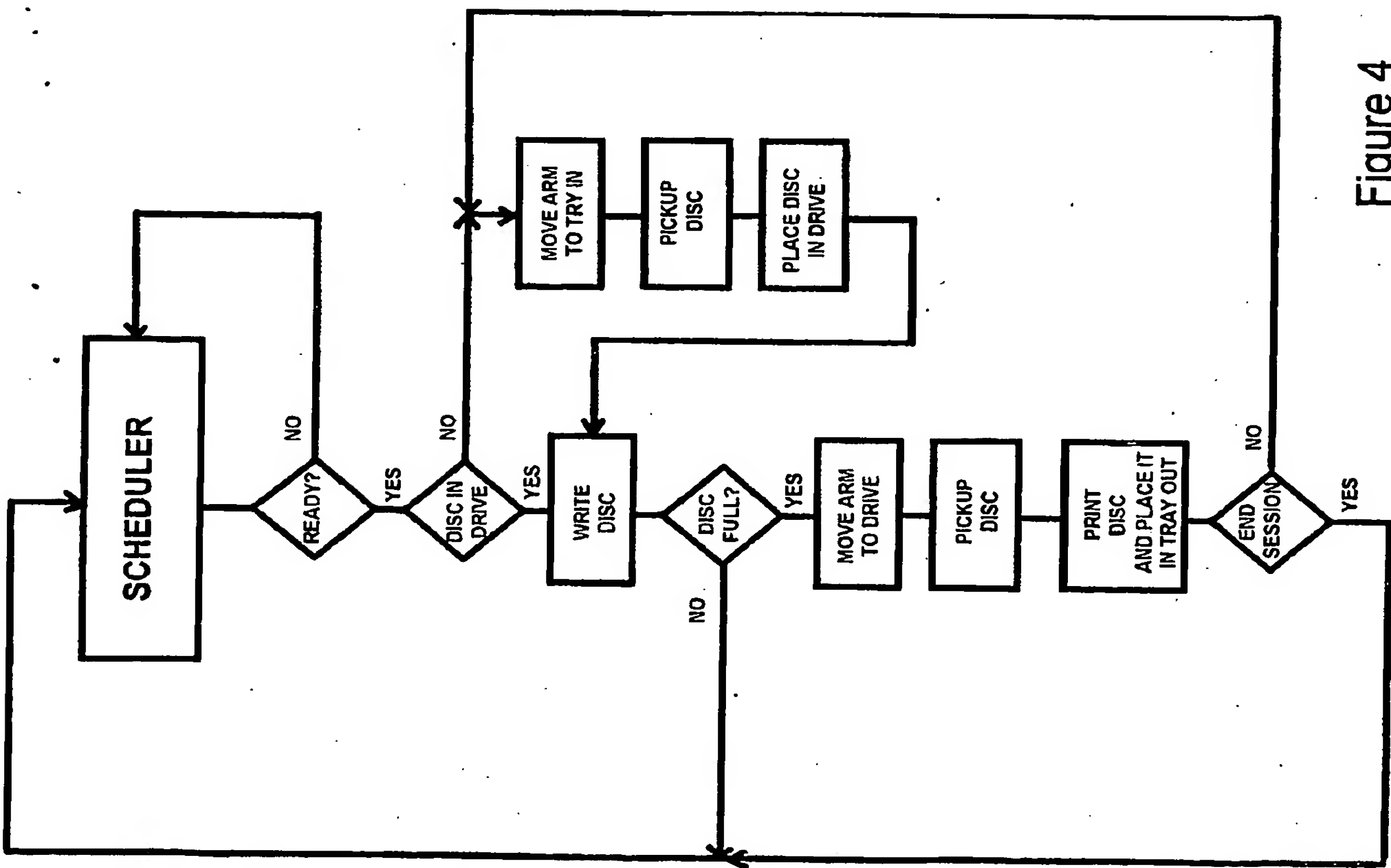
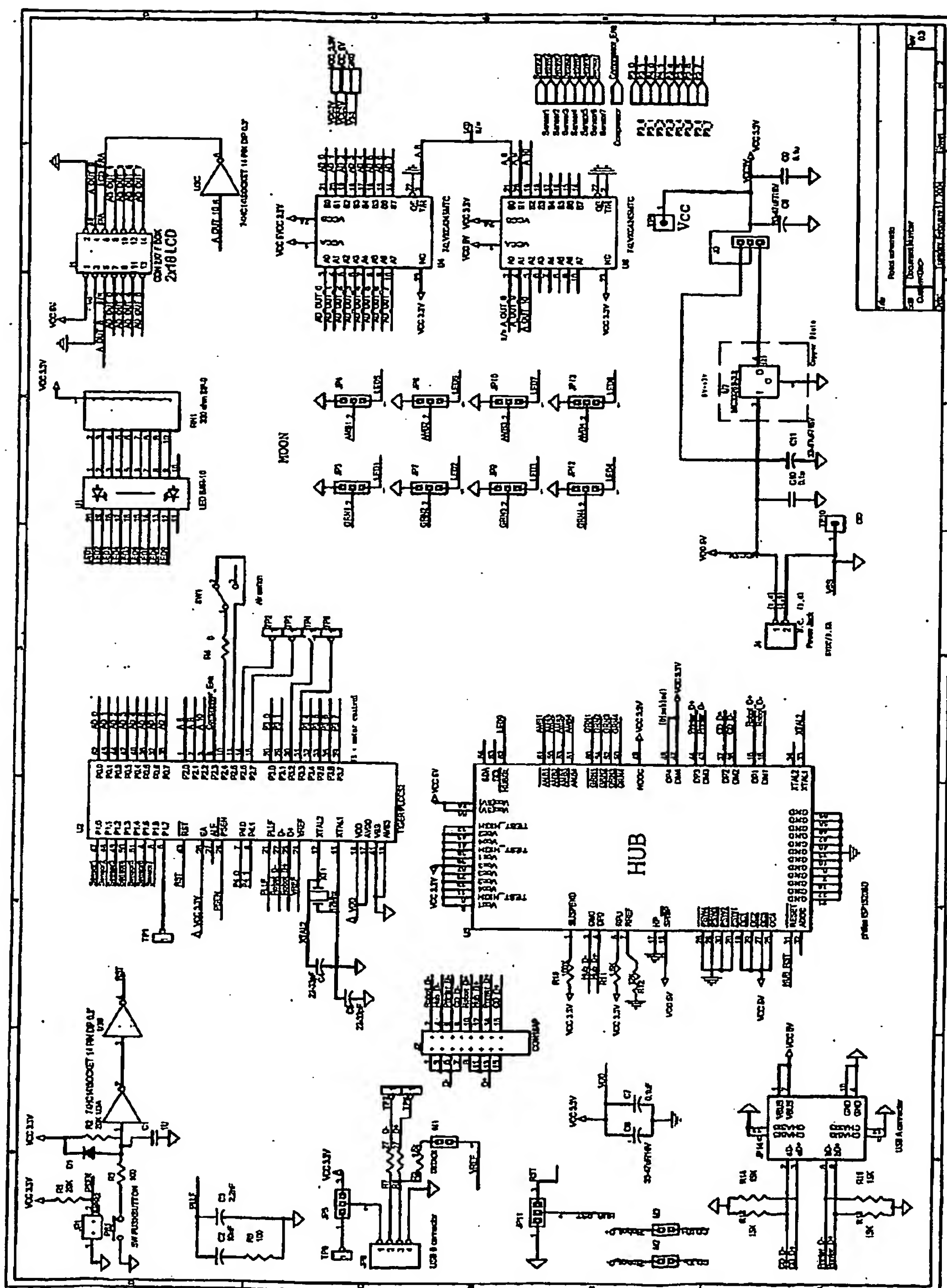


Figure 4



## Figure 5.

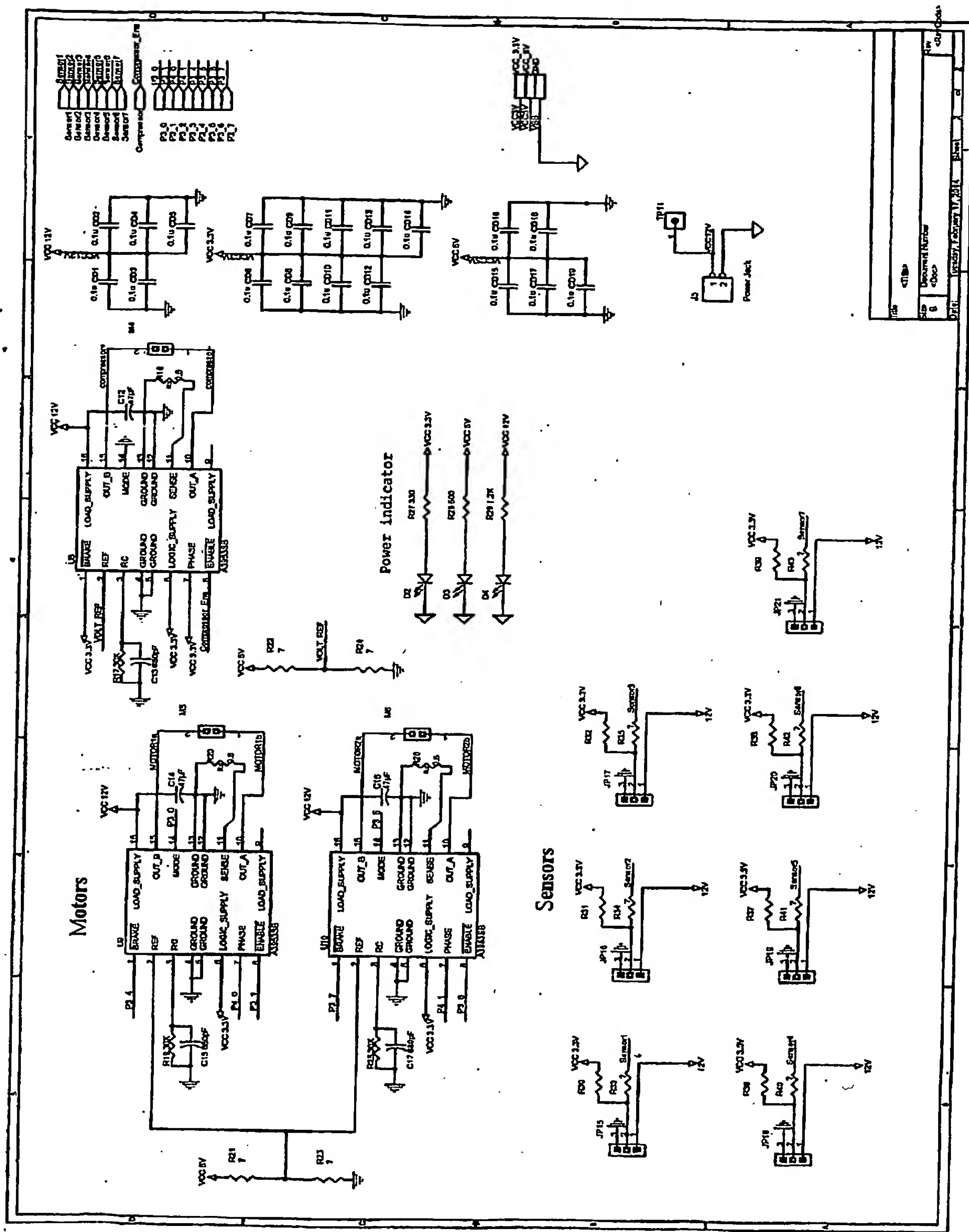


Figure 6



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Applicant's or agent's file reference C-0036-0001	IMPORTANT NOTIFICATION
International application No. PCT/IL05/000359	International filing date (day/month/year) 31 March 2005 (31.03.2005)
International publication date (day/month/year)	Priority date (day/month/year) 01 April 2004 (01.04.2004)
Applicant WAIMAN, Victor	

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<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
01 April 2004 (01.04.2004)	60/558,128	US	31 May 2005 (31.05.2005)

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